

Materials and Methods

SURVEY AREA

A survey of the Central Valley and adjacent foothills was conducted during the period from 10 April to 31 July 1991; 45 total days were spent in the field. William S. Pence assisted from 4 June to 31 July 1991.

A total of 230 sites with *Sambucus* were examined, mostly in riparian habitats along the major rivers and streams from the Central Valley floor to the adjacent foothills of the Sierra Nevada and Coast Ranges (Figure 8). Elderberry shrubs/trees along most of the Sierran rivers were surveyed only up to the large reservoirs found usually from 700-1000 feet in elevation. However, in some areas plants were checked up to maximum elevations of 2000 feet, or until they or exit holes were no longer found. Special effort was directed to the areas around Redding at the northern end of the Central Valley, and Bakersfield at the southern end, to determine the north-south range of the beetle. Although some areas with previous records were surveyed, primary emphasis was placed on finding new populations. Due to the large scope of this project and the short time allocated, areas examined were mostly located adjacent to public roadways and in parks where rapid access was possible.

DOCUMENTATION

Detailed field notebooks were kept of all elderberry sites surveyed (consecutively numbered); areas where *Sambucus* was not found to be present were also noted. Complete locality information for the numbered sites (designated in this report as "#" followed by a numeral) is given in Appendix I. The two volume DeLorme *California Atlas and Gazetteer* (1986) was used in navigating during the field survey. Routes followed were highlighted in yellow, and color-coded dots were placed at VELB localities, including records from previous studies. Original field notes and atlases will be deposited at the Sacramento Field Office of the U. S. Fish and Wildlife Service.

Sites with present or past VELB populations examined during this survey have also been pin-pointed on 7.5 minute U.S.G.S. topographic

maps. Color-coded dots bear the site number, with red signifying adult records; blue, recent exit holes; and green, old exit holes. Due to space limitations on the maps, not all elderberry plants with holes or types of holes found at a site are represented by a dot: if recent holes were present, old holes are usually not indicated. Site elevations were determined from topographic maps, and the accuracy depended on the contour interval of the particular map. The overall range of the beetle as determined by this study and historic records is illustrated on 1:50,000 and 1:1,000,000 scale maps. All maps will be deposited at the Sacramento Field Office of the U. S. Fish and Wildlife Service.

A California Native Species Field Survey Form for each of the VELB sites has been prepared for the California Department of Fish and Game Natural Diversity Data Base (NDDDB); copies will also be filed at the Sacramento Field Office of the U. S. Fish and Wildlife Service.

Numerous photographs were taken using 35 mm color slide film. These included pictures of elderberry plants that were VELB habitat, those with different physical characteristics, and close-up shots of adult beetles and exit holes. The slides will be deposited at the Sacramento Field Office of the U. S. Fish and Wildlife Service.

FIELD TECHNIQUES

ELDERBERRY

In accordance with Jones and Stokes (1986), "*potential* VELB habitat is defined by the presence of mature and immature elderberry shrubs (*Sambucus* spp.)."

In most stands of *Sambucus* it was difficult to separate individual plants from adjacent ones. A clump may be a single individual with many root shoots and multiple trunks, or may be several individuals growing in close proximity. Therefore, the amount of elderberry surveyed was designated according to type of *growth form*:

- (1) tree - arborescent individual, usually with a single trunk (Figures 9, 10)
- (2) clump - discrete bush-like group with multiple shoots/stems/trunks (Figure 11)
- (3) grove - large discrete clump with more than 10 major trunks (Figure 12)

These types will be officially, collectively referred to as *groups* of elderberry. The terms *bushes* and *shrubs* may be used informally and loosely for an individual, and *stands* for an assemblage of individuals.

The *maximum diameter* of the largest trunk of a tree/clump/grove is indicative of its overall size and maturity. An English measure diameter tape, which converts circumference into diameter, was used to take measurements. Usually these were made at about breast height, i.e., 4.5 feet from the ground, but sometimes multiple trunks or masses of young shoots caused a small deviation from this. For descriptive convenience, the following arbitrary scale depicting age class was used:

- (1) very young - <1 inch maximum diameter
- (2) young - >1-<2 inches
- (3) young mature - >2-<3 inches
- (4) mature - >3 inches

The physical condition of an elderberry plant was noted in view of its general health and any damage present. *Health* was reported as:

- (1) good - vigorous growth, green foliage
- (2) fair - some sickly young shoots, foliage slightly droopy or yellowish
- (3) poor - many dead/dying young shoots and/or branches, foliage droopy and yellowish

Those in the *poor* category could be considered "stressed." Three types of elderberry *damage* was observed, usually inflicted by man: cutting, fire, and herbicide.

The *density* of elderberry in the immediate vicinity of a surveyed site was subjectively determined as follows:

- (1) isolated - one to a few lone trees/clumps, or a grove, with no others in sight
- (2) scattered - several trees/clumps/groves spaced widely apart
- (3) many - lots of trees/clumps often in groves, large clusters, or linear configurations along fencerows or levees

Thirty-six specimens of *Sambucus* foliage and flowers from 34 sites were prepared for identification by pressing and drying in a plant press. Most of these were taken from plants with VELB exit holes or where adults were found. All elderberry plants at a particular site are assumed to be the same species. The determinations are given in Appendix II. The specimens were identified by Lauramay Dempster of the Jepson Herbarium, University of California, Berkeley, and will be permanently deposited there as vouchers. Dempster is currently preparing the section on the genus *Sambucus* for the forthcoming *Jepson Manual* on the flora of California.

VALLEY ELDERBERRY LONGHORN BEETLE

In accordance with Jones and Stokes (1986), "*actual* VELB habitat is defined by the presence of VELB adults or elderberry shrubs with VELB emergence holes."

Elderberry plants were examined for evidence of the VELB by scanning the foliage, flowers, trunks, and branches for adult beetles, and the trunks and branches for exit holes. Binoculars were frequently used to examine the external canopy of large clumps; the inside of the canopy and trunks/branches were checked with the unaided eye.

When adult(s) were found, their substrate (leaf or branch/trunk), position (outside or inside canopy, right side up or upside down), and height above the ground were recorded. Specimens collected will be permanently deposited at the Natural History Museum of Los Angeles County (Entomology Section), Los Angeles. Subspecific identification was verified by Dr. John A. Chemsak, University of California, Berkeley, an authority on the longhorn beetles (Cerambycidae). In addition, all specimens of *Desmocerus californicus* housed in the California Academy of Sciences, Golden Gate Park, San Francisco, were borrowed on loan and also verified by Dr. Chemsak. These included specimens collected by Halstead outside the previously known range of the VELB in Merced, Madera, and Fresno counties.

All holes (with the proper characteristics, as explained below) found in elderberry in the Central Valley and the adjacent foothills of the Sierra Nevada and Coast Ranges were assumed to be VELB exit (=emergence) holes. If a small number of holes were present at a site, data were recorded for each; with large numbers, a series was selected which included any recent holes present. The relative age and condition of the individual exit holes were indicated thus:

- (1) recent - current-year, clean-cut with fresh, light-colored wood inside
- (2) old - not made this year, but clean-cut and undamaged, wood inside discolored (Figure 13)
- (3) old poor - not clean-cut, eroded and/or enlarged by other insects, rot, or bird pecking (Figures 17, 18)
- (4) partly healed - hole partially closed by growth (Figure 14)
- (5) healed - hole completely occluded resembling an opening closed by a drawstring, cut-out circle usually still obvious in the bark (Figure 15)

A mini-flashlight was used to illuminate the dark interiors of the holes in order to determine whether or not they were recent. When it was

difficult to decide if a hole was new or not, it was entered as old. Only holes in good condition and of the proper size and shape (i.e., clean-cut, circular or slightly oval, and 7-10 mm in diameter) were recorded as VELB exit holes (Figures 6, 7, 13).

The condition of the branch or trunk(=stem) bearing exit hole(s), whether alive or dead, was noted. The longer wood has been dead, the more difficult it is to determine if the holes were originally caused by the VELB or by insects which bore in dead wood (Figures 17, 18). Pecking by birds, as well as the secondary invasion of such insects (Figure 16), can also obscure signs of VELB presence. All of the sites listed in this report, except three, are thought to have definite evidence of recent or previous VELB activity. The remaining three are reported as possibilities. Forty-two wood samples with possible exit holes were taken from 30 sites. Mostly dead wood, these were longitudinally sectioned with a bandsaw to confirm VELB habitation by the presence of larval galleries. The wood samples, tagged with locality and other data, will be permanently housed at the Natural History Museum of Los Angeles County (Entomology Section), Los Angeles.

Other exit hole data recorded were the diameter of the branch/trunk at the exit hole measured with an English diameter tape, and the vertical height of the hole above the ground taken with a standard English tape measure.